

REMARKS

Applicant respectfully requests reconsideration. Claims 1-27 and 29-41 were previously pending in this application. Claims 1, 2, 6, 9, 10, 14, 16, 19, 32, 33 and 39 have been amended. New claims 43-46 have been added. As a result, claims 1-27, 29-41 and 43-46 are pending for examination. No new matter has been added.

Claim 1 has been amended to require that a detergent is added to the fuel prior to the introduction of the fuel to a vehicle or other apparatus comprising an internal combustion engine. Support for the amendment is found on page 7, lines 1-5 of the specification. This passage refers to adding the cerium oxide with a detergent to fuel before it is introduced to a vehicle.

New claims 43 and 45 are based on page 6, lines 3-4 of the description.

New claims 44 and 46 are based on page 7, lines 14-15 of the description.

In addition, minor amendments have been made to some claims for clarification.

Allowable Claims

Applicant notes that the Examiner has not rejected claims 17 and 18 under 35 U.S.C. § 102 or 35 U.S.C. § 103, or for any other reason. Accordingly, Applicant respectfully submits that claims 17 and 18 should be indicated as allowable.

Rejections Under 35 U.S.C. § 102

The Examiner rejected claims 1-13, 26-27, 29, 32 and 41 under 35 U.S.C. § 102(b) as being anticipated by Hazarika et al. (WO 02/00812 A2). Applicant respectfully traverses the rejection and requests reconsideration.

The Examiner considers that claim 1 includes the feature that the cerium oxide and/or doped cerium oxide is to be added to the fuel prior to the introduction of the fuel to a vehicle or other apparatus comprising an internal combustion engine. It is noted that the Examiner has not shown that this feature is present in Hazarika et al. Claim 1 as amended now requires that both (a) cerium oxide and/or doped cerium oxide, and (b) a detergent are added to the fuel prior to the introduction of the fuel to a vehicle or other apparatus. This feature is not disclosed in Hazarika et al.

The Examiner suggests that the surfactant used to coat the lanthanide oxide particles in Hazarika et al. is a detergent fuel additive (see lines 7-8 of the last paragraph on page 2 of the Office Action). Applicant asserts that the surfactant disclosed in Hazarika et al. (see page 6, lines 1-14 of Hazarika et al.) is different than the detergent in claim 1 of the present application.

The term “detergent”, in the context of fuels and fuel additives, is well known in the art as referring to a substance that is added to a fuel to reduce or prevent the accumulation of hydrocarbon deposits in the combustion chamber and/or intake valves of an engine. These deposits are produced by combustion of the fuel. In the combustion chamber, the deposits inhibit heat transfer between the chamber and the engine cooling system, which may lead to engine knocking and, eventually, stress fatigue and wear in pistons, connecting rods, bearings and cam rods of the engine. The intake valve deposits interfere with valve motion and valve sealing, which reduce volumetric efficiency of the engine and limit maximum power.

The surfactant coatings described in Hazarika et al. are intended to aid dispersion of the lanthanide oxide particles in fuel (see page 5, lines 21-22 and page 6, lines 1-3 of Hazarika et al.). As the Examiner will undoubtedly appreciate, the hydrocarbon deposits that form in a combustion engine have very different solubility characteristics as compared to lanthanide oxides. Lanthanide oxides are polar, ionic compounds, whereas hydrocarbon deposits are generally non-polar, organic substances. Thus, the fuel detergents generally have a different chemical structure to the surfactants exemplified in Hazarika et al.

It is further noted that the surfactant coating in Hazarika et al. should break down immediately upon entering the combustion chamber of an internal combustion engine so as to ensure that the catalytic activity of the lanthanide oxide is not harmed (see page 6, lines 16-19 of Hazarika et al.). In contrast, fuel detergents are expected to have a greater lifetime in fuel in order that they may prevent the formation, or assist in the removal of deposits that form in an engine. The surfactant in Hazarika et al. are unsuitable for use as a fuel detergent.

Finally, claims 8-11 of the present application are directed to a method that involves the addition of coated cerium oxide particles. These coatings are similar to the surfactant coatings disclosed in Hazarika et al. at page 6, line 9.

In summary, Hazarika et al. does not disclose a fuel detergent. Therefore claims 1-13, 26-27, 29, 32 and 41 are not anticipated by Hazarika et al. Accordingly, withdrawal of this rejection is respectfully requested.

Rejections Under 35 U.S.C. § 103

1. The Examiner rejected claims 14-16 and 30-31 under 35 U.S.C. § 103(a) as being unpatentable over Hazarika et al. (WO 02/00812 A2). Applicant respectfully requests reconsideration.

The present invention is based on the surprising finding that one is able to add cerium oxide (either doped or non-doped) and a detergent to a fuel, prior to the introduction of the fuel to a vehicle etc. (for example, at a fuel depot or at a refinery and therefore possibly some long time before combustion will occur) and obtain significant enhancement in combustion efficiency without the expected separation of the cerium oxide from the fuel.

As argued in the response to the anticipation rejection above, there is simply no mention in Hazarika et al. of adding a detergent to fuel. Moreover, there is nothing in Hazarika et al. that would motivate a person skilled in the art to add a detergent to a fuel prior to the introduction of

the fuel to a vehicle. Rather, person of ordinary skill in the art would regard the inclusion of other additives, such as a detergent, to bulk supplies of fuel as a considerable restriction to operational flexibility in the use of that fuel.

Furthermore, given that the solubility characteristics of hydrocarbon deposits found in an engine and that of cerium oxide particles are very different, a person skilled in the art might expect the fuel detergent to aid solid separation or precipitation of the cerium oxide particles from a fuel. Consequently, the skilled person would not add both the cerium oxide and the detergent to a fuel prior to its introduction and use in an internal combustion engine or other apparatus.

The claimed invention thus is not obvious over Hazarika et al., and accordingly, withdrawal of this rejection is respectfully requested.

2. The Examiner rejected claims 19-25 and 33-40 under 35 U.S.C. §103(a) as being unpatentable over Hazarika et al. (WO 02/00812 A2) in view of Collier et al. (US 2003/0182848). Applicant respectfully requests reconsideration.

The present invention is based on the surprising finding that one is able to add cerium oxide (with or without dopants or non-doped) and a detergent to a fuel, prior to the introduction of the fuel to a vehicle, etc. (for example, at a fuel depot or at a refinery and therefore possibly some long time before combustion will occur) and obtain significant enhancement in combustion efficiency without the expected separation of the cerium oxide from the fuel.

As argued in the response to the anticipated rejection above, there is simply no mention in Hazarika et al. of adding a detergent to fuel. Moreover, there is nothing in Hazarika et al. that would motivate a person skilled in the art to add a detergent to a fuel prior to the introduction of the fuel to a vehicle. Rather, person of ordinary skill in the art would regard the inclusion of other additives, such as a detergent, to bulk supplies of fuel as a considerable restriction to operational flexibility in the use of that fuel.

Furthermore, given that the solubility characteristics of hydrocarbon deposits found in an engine and that of cerium oxide particles are very different, a person skilled in the art might expect the fuel detergent to aid solid separation of precipitation of the cerium oxide particles from a fuel. Consequently, the skilled person would not add both the cerium oxide and the detergent to a fuel prior to its introduction an use in an internal combustion engine or other apparatus.

The Examiner has combined the teachings of Hazarika et al. with Collier et al. Collier et al. has a US filing date of March 10, 2003 and a publication date of October 2, 2003. For use as a prior art reference, the priority date of Collier et al. is not earlier, because the applications to which it claims priority are both European applications, and therefore these application do not support an earlier prior art date under 35 U.S.C. 102 or 103. Both the US filing date and the publication date of Collier et al. are after the priority date of the instant application, which is January 23, 2003. The claims of the instant application are entitled to the priority of January 23, 2003, and therefore Collier et al. is not prior art against these claims.

Therefore, Collier et al. may not be combined with Hazarika et al. The claimed invention thus is not obvious over Hazarika et al. alone as described above.

Accordingly, withdrawal of this rejection is respectfully requested.

CONCLUSION

A Notice of Allowance is respectfully requested. The Examiner is requested to call the undersigned at the telephone number listed below if this communication does not place the case in condition for allowance.

If this response is not considered timely filed and if a request for an extension of time is otherwise absent, Applicant hereby requests any necessary extension of time. If there is a fee occasioned by this response, including an extension fee, the Director is hereby authorized to charge any deficiency or credit any overpayment in the fees filed, asserted to be filed or which should have been filed herewith to our Deposit Account No. 23/2825, under Docket No. K0181.70020US00.

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Respectfully submitted,

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